National Park Service
U.S. Department of the Interior

Natural Resource Program Center

Inventory of Fish Species in Fort Clatsop National Memorial, Astoria, Oregon (2002)

Natural Resource Technical Report NPS/NCCN/NRTR—2008/143

ON THE COVER
Juvenile Cutthroat trout
Photograph courtesy of NPS files

Inventory of Fish Species in Fort Clatsop National Memorial, Astoria, Oregon (2002)

Natural Resource Technical Report NPS/NCCN/NRTR—2008/143

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Port Angeles, Washington 98362

December 2008

U.S. Department of the Interior
National Park Service
Natural Resource Program Center
Fort Collins, Colorado

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Acknowledgements

Special thanks to Nancy Eid (FOCL), Lynne Johnson (FOCL), Phil Kennedy (OLYM), and Scott Stonum (FOCL) for their assistance with the sampling of fish in Alder and Hansen Creeks; Doug Markle (Oregon State University) and Katherine Pearson (University of Washington Fish Collection) who aided in the fish identification to confirm the species list; John Meyer who provided comments to this report; and Lee Cain and students from Astoria High School who conducted the seining in lower Alder Creek.

Introduction

From February 5 to 7, 2002, fisheries biologists from Olympic National Park (OLYM) conducted a general inventory of fish species in two streams that flow through Fort Clatsop National Memorial (FOCL) (Figure 1). Prior to these surveys, there were no published reports of fish species that inhabit streams that drain through FOCL (personal communication, Scott Stonum, Chief of Resources at FOCL; Joe Sheahan, Oregon Department of Fish and Wildlife, Astoria). Water quality surveys were conducted in ponds and streams throughout FOCL from 1994 to 1997 (Larson and Ek 1998). These surveys provided a baseline inventory of water quality variables and documented diverse and variable water quality characteristics in the park.

The inventory of fish species occurred in portions of Alder Creek and Hansen Creek. The goal of the project was to establish a baseline inventory of fish species that inhabit each creek. Specifically, the objectives were to: 1) determine the presence of fish species in each creek; 2) determine general distributions of fish in each creek; 3) establish a small collection of voucher specimens; and 4) provide recommendations related to fisheries resources in FOCL.

Study Area

FOCL, located near Astoria, Oregon, is 51 ha in size and contains streams, springs, and ponds that ultimately drain into the Lewis and Clark River, a tributary to the Columbia River. The waterways in FOCL include the tidally-influenced Lewis and Clark River, two unnamed brackish sloughs, four ephemeral streams, two ephemeral springs, and wetland habitats (Larson and Ek 1998). Portions of FOCL are located on each side of the Lewis and Clark River, one mile upstream from the confluence with the Columbia River. The Lewis and Clark River drains into the Columbia River, and contains some the last freshwater refugia for juvenile salmonids emigrating down the Columbia Basin to the ocean. In and around FOCL, aquatic habitats have been negatively influenced by logging activities, residential development, installation of dikes, and the presence of barriers such as tide gates and culverts.

The following fish species are known to occur in the Lewis and Clark River: coho salmon (*Oncorhynchus kisutch*), chinook salmon (*O. tshawytscha),* chum salmon (*O. keta*), steelhead trout *(O. mykiss*), cutthroat trout *(O. clarki*), American shad (*Alosa sapidissima),* white sturgeon (*Acipenser transmontanus*), chiselmouth (*Acrocheilus alutaceus*), peamouth (*Mylocheilus caurinus*), and lamprey species (*Lampetra spp.)* (personal communication, Joe Sheahan, Oregon Department of Fish and Wildlife on February 19, 2002). Eulachon *(Thaleichthys pacificus)* also have been reported in the Fort Clatsop area (FOCL 1995).

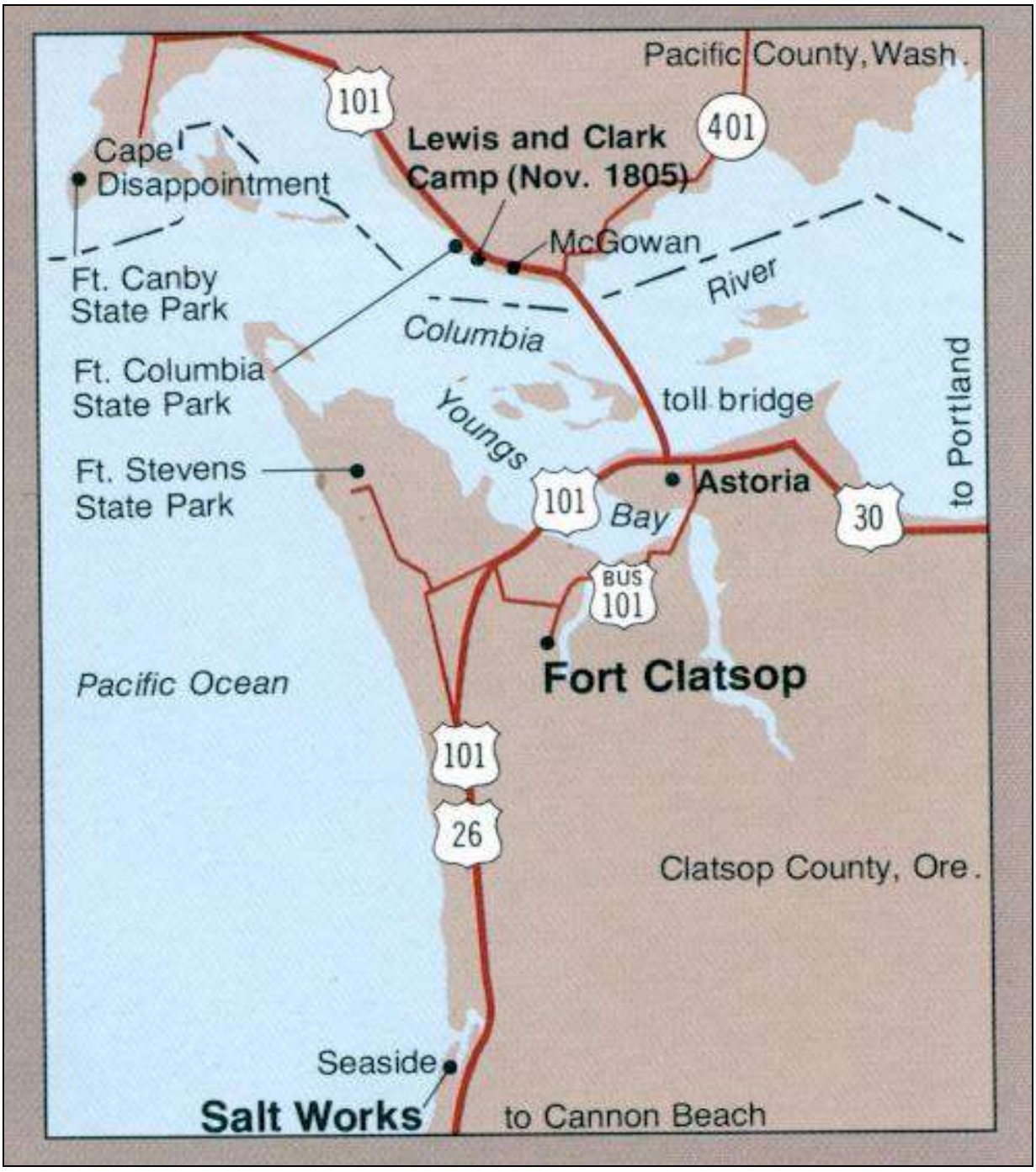

Figure 1. Location of Fort Clatsop National Memorial, Oregon.

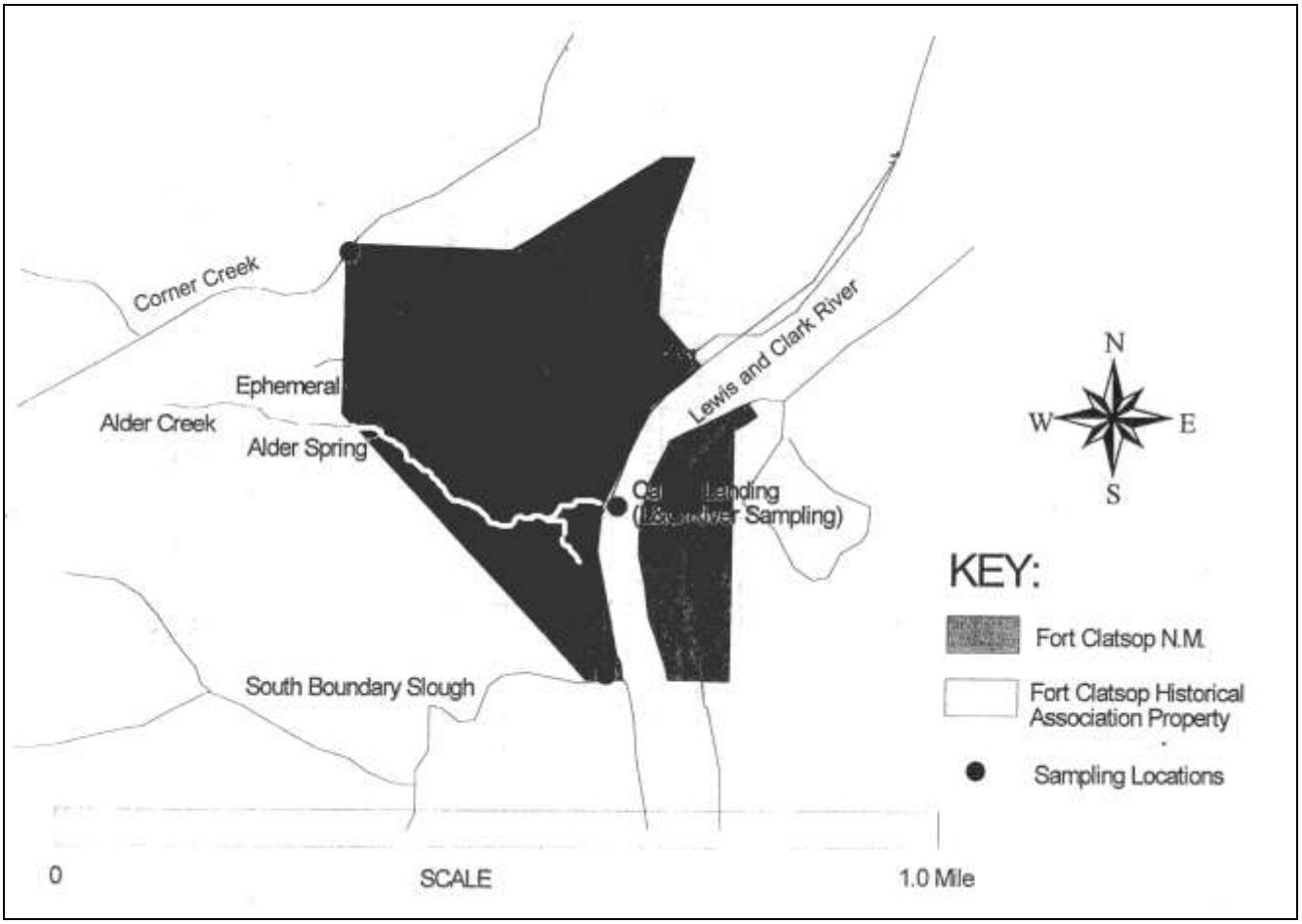

Figure 2. Location of Alder Creek and Corner Creek (Hansen Creek) in relation to Fort Clatsop National Memorial, Oregon.

This study focused on sampling fish that inhabit Alder Creek and Hansen Creek (Figure 2). Alder Creek is the provisional name of a small creek that originates on Weyerhauser Industries land immediately west of FOCL. Mean monthly discharge of Alder Creek in FOCL is 0.62 cfs (range 0.01 to 8.70 cfs) (Larson and Ek 1998). The stream drains 18.1 ha, is 1.1 km in length (0.36 km within FOCL), and flows into the Lewis and Clark River near the Canoe Landing Slough (Larson and Ek 1998). The creek flows through commercial forestlands, descends in elevation from 23 m to 2 m, and goes subsurface for several meters in FOCL. The portion of Alder Creek immediately downstream from the Fort Clatsop Loop Road is regulated by a closed tide gate that likely is barrier to upstream and downstream movements of fish during certain streamflows. The lower portion of Alder Creek is tidally influenced.

Hansen Creek (or "Corner" Creek) is the name given to a stream that originates on Weyerhauser Industries land located outside of FOCL. Only 24 m of Hansen Creek (or 0.7% of its total length) flow through FOCL. Hansen Creek drains 200 ha, is ~3.3 km in length, and descends in elevation from 30 m to 2 m to its confluence with the Lewis and Clark River. Mean monthly discharge of the stream is 2.41 cfs (range 0.01 to 33.17 cfs) (Larson and Ek 1998). Outside of FOCL, the creek flows through two large culverts under Business Route of Highway 101. The creek also flows through culverts under the road immediately northeast of FOCL. The lowermost portion of the creek flows through a tide gate before entering the Lewis and Clark River opposite of Jeffers Slough.

Methods

To determine presence or non-detection of fish species in Alder and Hansen Creeks, single-pass electrofishing without block-nets was employed in each stream from February 6 to 7, 2002. A two-person crew, equipped with a Smith-Root Model 12A backpack electrofisher and dip-nets proceeded upstream capturing and identifying fish. Fish captured during electrofishing surveys were enumerated by species and the range of lengths for each species was measured to the nearest mm. Fish were released near their point of capture. To confirm species identification, a total of seven fish from Alder Creek and one fish from Hansen Creek were vouchered in 95% ethanol. Species identification was verified by Katherine Pearson (Manager of Fish Collection at University of Washington) and Douglas Markle (Ichthyologist, Oregon State University). All specimens were returned to FOCL to facilitate the development of a reference collection of fish species that inhabit the area.

The following three reaches of Alder Creek were sampled using the electrofisher (Figure 1): reach one from ~creek km 0.0 to 0.45 (the tide gate located on the downstream side of Fort Clatsop Loop Road); reach two from creek km 0.45 to 0.85; and reach three from creek km 0.85 to ~1.00. Additionally, a seine (40 m x 3 m; 0.5 cm mesh) was used to sample fish species in lower Alder Creek (near km 0.2) and at the confluence of the creek with the Lewis and Clark River on February 7, 2002. In Hansen ("Corner") Creek, we conducted electrofishing in the following two reaches of Hansen Creek: reach one from creek km 1.93 to 2.25 (northwestern corner of park); and reach two extended from creek km 2.25 to ~2.90.

To determine presence or non-detection of fish species in lower Hansen Creek, minnow traps baited with cat food were deployed for up to 20 hours near the creeks confluence with the Lewis

and Clark River and at the Highway 101 Business Route crossing the creek from February 5 to 7, 2002. Traps were deployed upstream and downstream of culverts or tide gates. We were unable to conduct backpack electrofishing in the lower portions of Hansen Creek based on the deep water.

All fish sampling was conducted in accordance with a permit issued by Oregon Department of Fish and Wildlife (Permit No. OR2002-134) and the 4(d) Scientific Research limit under the Endangered Species Act as implemented by the National Marine Fisheries Service (NMFS), Protected Resources Division (Appendix A).

The following tides series occurred in the Columbia River (at Tongue Point) during the period of sampling: February 6, 2002 (low=0152 and 1537; high=0812 and 2154); February 7, 2002 (low=0302 and 1640; high 0912 and 2300).

Results

A total of 9 fish species from five different families (Cottidae, Cyprinidae, Cyprinodontidae, Gasterosteidae, and Salmonidae) were observed in Alder Creek. The following fish species were captured in Alder Creek: Pacific staghorn sculpin (*Leptocottus armatus),* prickly sculpin (*Cottus asper),* reticulate sculpin (*Cottus perplexus*), threespine stickleback (*Gasterosteus aculeatus*), banded killifish *(Fundulus diaphanus),* cutthroat trout (picture in Appendix B1), and coho salmon (picture in Appendix B2). Additionally, peamouth (*Mylocheilus caurinus)* and chum salmon fry (*O. keta*) (picture in appendix B-3) were captured in the seine at the junction of Alder Creek and the Lewis and Clark River. Additionally, we captured one cope's giant salamander (*Dicamptodon copei)* in Alder Creek (picture in Appendix B3).

The following fish species were observed in Hansen Creek: prickly sculpin (*Cottus asper),* threespine stickleback, coho salmon, and lamprey spp. Additionally, we observed bullfrog (*Rana catesbeiana),* Pacific treefrog *(Hyla regilla),* and crayfish spp. (*Pacifasticus spp*.). See Appendixes C and D for original data forms.

Table 1. Summary of fish and amphibian species captured in Alder Creek (creek km 0.0 to creek km 1.0) based on electrofishing surveys conducted on February 6, 2002 and fish species captured during seining surveys conducted on February 7, 2002.

Fish Species Observed in Alder Creek	***No. of Each Species***	***Mean Total Length***	***Range in Total Length***	***Comments***
Rkm 0.0 to 0.45				
Reticulate sculpin	3	53 mm	34 to 68 mm	One voucher= FOCL-02-FV-5
Threespine stickleback	192	NA	20 to 64 mm	Two vouchers= FOCL-02-FV-2 & FOCL-02-FV-3
Banded killifish	3	60 mm	32 to 79 mm	One voucher= FOCL-02-FV-4
Rkm 0.45 to 0.85				
Prickly sculpin	4	63 mm	35 to 85 mm	FOCL-02-FV-1
Cutthroat trout	1	162 mm	162 mm	See Appendix B-1.
Coho salmon	4	93 to 100 mm	NA	
Cope's giant salamander	2	78 to 113 mm	96 mm	
Rkm 0.85 to ~1.00				
Cope's giant salamander	2	110 to 146 mm	128 mm	
Seine Survey at 0.0				
Pacific staghorn sculpin	2	42 to 80 mm	61 mm	One Voucher= FOCL-02-FV-8
Chum salmon Fry	1	42 mm	42 mm	See Appendix B-3
Threespine stickleback	300 +	NA	NA	
Peamouth	1	52 mm	52 mm	One voucher= FOCL-02-FV-7

Table 2. Summary of fish and amphibian species captured in two reaches of Hansen Creek based on electrofishing and minnow trap surveys conducted from February 5 to 7, 2002.

Fish Species Observed in Hansen Creek	***No. of Each Species***	***Mean Total Length***	***Range in Total Length (mm)***	***Comments***
Rkm 1.93 to 2.25				
Prickly sculpin	29	NA	Up to 101 mm	FOCL-02-FV-6
Coho salmon	2	117	110 to 123 mm	
Lamprey Spp.	2	NA	130 mm	
Pacific treefrog	1	NA	NA	
Rkm 2.25 to 2.90				
Unidentified sculpin	8	NA	51 to 90 mm	
Minnow Trapping in Lower Hansen Creek @ ~Rkm 0.10				
Crayfish spp.	1	NA	NA	Located near confluence of Lewis and Clark River downstream of tide gate
Threespine stickleback	1	45 mm	45 mm	Located at HWY 101 Business Route crossing stream
Unidentified sculpin	1	50 mm	50 mm	Located at HWY 101 Business Route crossing stream
Bullfrog	1	110 mm	110 mm	Located at HWY 101 Business Route crossing stream

Discussion

A total of nine fish species were observed in Alder Creek and five fish species in Hansen Creek. The abundance of each species was relatively low throughout each stream. Generally, there is limited spawning and rearing habitat throughout FOCL. It is likely that we did not capture the entire fish species assemblage in FOCL based on the limited sampling effort (spatially and temporally), the extent of seasonal movements of fish, and the presumed high occurrence of non-native fish species in the lower Columbia Basin.

A thorough inventory was conducted in Alder Creek from the mouth to creek km 1.0. Sampling occurred in ~91% of the Alder Creeks total length although the uppermost portions of the stream were not sampled. A less complete inventory occurred in Hansen Creek (creek km 1.93 to 2.90) when compared to the higher survey effort in Alder Creek. Sampling occurred in only ~30% of the total length of Hansen Creek.

One chum salmon fry was captured during seining surveys at the mouth of Alder Creek. Columbia River chum salmon are listed as at threatened species under the Endangered Species Act. Critical habitat is designated to include all river reaches accessible to listed chum salmon (including estuarine areas and tributaries) in the Columbia River downstream from Bonneville Dam, excluding Oregon tributaries upstream of Milton Creek at river km 144 near the town of St. Helens.

Juvenile coho salmon were observed upstream of tidegates in both Alder and Hansen Creeks. These fish were offspring of coho that spawned in autumn 2000. Oregon Coast coho salmon are no longer listed as a threatened species under the Endangered Species Act based on a recent court decision (Alsea Alliance v. Evans) although the species is designated as being in critical condition by the Oregon Department of Fish and Wildlife. At present, it is unclear whether Oregon coho will merit future ESA protection. Nevertheless, the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The EFH mandate applies to all fish species managed under a federal Fishery Management Plan and includes coho salmon, chinook salmon, chum salmon, coastal pelagic species, and groundfish.

One cutthroat trout was observed in Alder Creek. At the time that the sampling occurred, coastal cutthroat trout were designated as a critical species by the Oregon Department of Fish and Wildlife (http://www.dfw.state.or.us/ODFWhtml/InfoCntrWild/Diversity/senspecies.pdf). Columbia River/Southwest Washington cutthroat trout are proposed for listing as a threatened species under ESA.

Perhaps the most surprising observation was the presence of the banded killifish in lower Alder Creek. The banded killifish is a member of the Family Fundulidae. It typically occurs from South Carolina north to Newfoundland and east to Pennsylvania (Scott and Crossman 1973; Figure 3). Observations of banded killifish in the Pacific Northwest include specimens collected from Washington (Hardy Creek, Kalama River, lower Columbia River) and the Willamette River Basin in Oregon. It is believed that banded killifish have been released from private aquariums

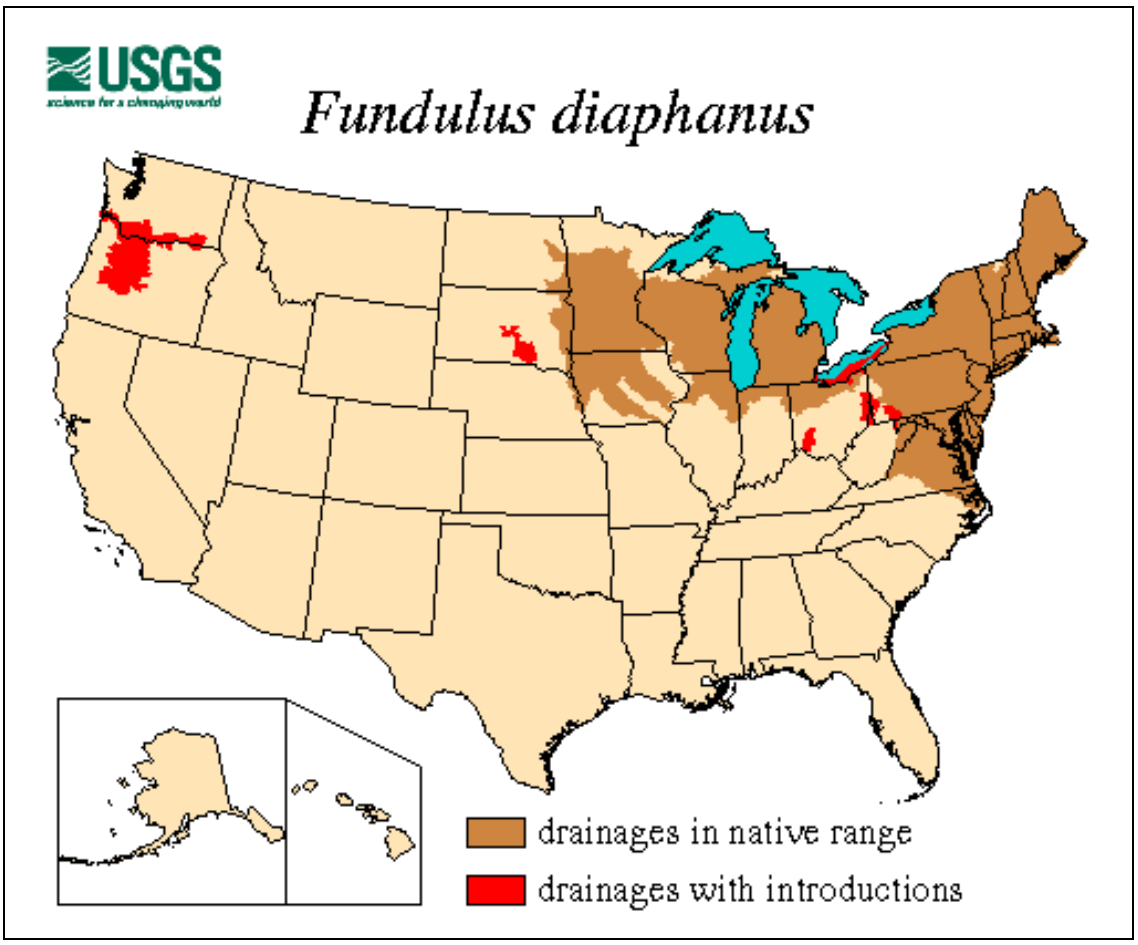

Figure 3. General range of banded killifish in the United States (Adopted from the U.S. Geological Survey http://nas.er.usgs.gov/fishes/accounts/fundulid/fu_diaph.html, 2002).

into Northwest waters (personal communication, Douglas Markle, Oregon State University, February 13, 2002). The influence of this species on native fishes of the Northwest remains unknown.

We observed two native amphibians (cope's giant salamander and Pacific treefrog) and one non-native frog (bullfrog). Other amphibians known to occur in the vicinity of FOCL include: rough-skinned newts (*Taricha granulosa)*, ensatina (*Ensatina eschscholtzii*), northwestern salamander (*Ambystoma gracile)*, western red-backed salamander (*Plethodon vehiculum)*, red-legged frog *(Rana aurora*), and western toad (*Bufo boreas)* (FOCL 1995).

Recommendations

Based on the results from these surveys, I recommend the following:

1) To detect additional fish species that may inhabit Alder and Hansen Creeks, design a sampling schedule that varies temporally and spatially.
2) Address how to manage non-native fish species in creeks and rivers in and around FOCL. Nonnative fish species may have deleterious effects on native fish fauna.
3) Implement habitat restoration efforts designed to eliminate barriers to fish movements (upstream and downstream migration). This may be accomplished by replacing tidegates in Alder Creek and Hansen Creek. Explore partnerships with ODFW and local watershed groups to accomplish restoration of fish passage.
4) Provide information related to fish species that inhabit FOCL to nearby state and federal agencies.
5) Based on the presence of federally listed fish species in the vicinity of FOCL, address consultation requirements under Section 7 of the Endangered Species Act.
6) Obtain the following reference books for resource staff and the library at FOCL:

- Bond, C. E. 1994 Revised. Keys to Oregon freshwater fishes. Department of Fish and Wildlife, Oregon State University, Corvallis. Published by OSU Book Stores, Inc. 53 p.
- Leonard, W. P., H. A. Brown, L. Jones, K. R. McAllister, and R. M. Storm. 1993. Amphibians of Washington and Oregon. Seattle Audubon Society, Washington. 168 p.
- Pollard, W. R., G. F. Hartman, C. Groot, and P. Edgell. 1997. Field identification of coastal juvenile salmonids. Harbour Publishing. 32 p.
- Scott, W. B. and E. J. Crossman. 1973. Freshwater fishes of Canada. Bulletin 184: Fisheries Research Board of Canada, Ottawa. 966 p.
- Wydoski, R. S. and R. R. Whitney. 1979. Inland fishes of Washington. University of Washington Press, Seattle. 220 p.

7) Conduct a search in University of Washington Fish Collection for any fish samples collected from FOCL. Contact Katherine Pearson, Collection Manager, University of Washington Fish Collection:

School of Aquatic and Fishery Sciences
Box 355100, 1140 Boat St., Room 005
Seattle, Washington 98195, U.S.A.
Email: pearsonk@u.washington.edu
TEL: 206-543-3816, FAX: 206-685-3275

Website: http://uwfishcollection.org/index.html

Literature Cited

Fort Clatsop National Memorial (FOCL). 1995. General management plan, development concept plan, and final environmental impact statement. National Park Service. Astoria, Oregon.

Larson, G. L. and D. A. Ek. 1998. Baseline water quality inventory - Fort Clatsop National Memorial. Technical Report NPS/CCOOSU/NRTR-98/12. United States Department of Interior-National Park Service, Columbia Cascades Support Office, Seattle.

Scott, W. B. and E. J. Crossman. 1973. Freshwater fishes of Canada. Bulletin 184: Fisheries Research Board of Canada, Ottawa.

Appendix A: Permits obtained from Oregon Department of Fish and Wildlife and National Marine Fisheries Service regarding sampling of fish in FOCL

Oregon

John A. Kitzhaber, M.D., Governor

Department of Fish and Wildlife
Fish Division
2501 SW First Avenue
PO Box 59
Portland, OR 97207
(503) 872-5252
FAX (503) 872-5632
Internet WWW:http://www.dfw.state.or.us/

SCIENTIFIC TAKING PERMIT - FISH

PERMITTEE: **Sam Brenkman**
ORGANIZATION: **National Park Service**

ADDRESS: **600 East Park Avenue**
Port Angeles,
WA 98362
PHONE: **(360) 565 3081**
E-MAIL: **brenkman@tenforward.com**
FEDERAL AUTHORIZATION: **4(d) Research Limit coverage from NMFS required**

PERMIT NUMBER: **OR2002-134**

DATES: **02/04/02 through 12/31/02**

NAME OF PROJECT LEADER: **Sam Brenkman**

SIGNATURE: _____

NAME OF COLLECTOR: **Scott Stonum, Phil Kennedy, Lee Cain, Nathan Truelove**

SIGNATURE: _____

TYPE OF PERMIT: **Individual** RENEWABLE: **YES** MAY COPY? **YES**

LOCATION WHERE COLLECTION ACTIVITY IS AUTHORIZED:
Lower Columbia-Youngs subbasin: Alder Creek, "Corner Creek", South Slough, and Lewis and Clark River

CONDITIONS AND AUTHORIZATION OF THIS PERMIT:

1. General conditions of Oregon Revised Statutes and Oregon Administrative Rules apply to this permit which cannot be used in lieu of any permit required by federal law or regulation. General conditions of Oregon revised statutes and Oregon administrative rules apply to this permit which cannot be used in lieu of any permit required by federal law or regulation. Permission to sample in areas where federally protected fish may occur is contingent upon the permittee obtaining necessary authorization from the appropriate federal agency and acting in accordance with the conditions established by the federal government.
2. This permit is not transferable from one company or person to another and must be carried on person while collecting.
3. Access to private property is contingent on the permission of the landowner. This permit does not authorize trespassing.
4. This permit is not valid in any refuge, park, city, wildlife area, or area closed to collection without written approval of manager or administrator.
5. Local officials of the Department of Fish and Wildlife and Oregon State Police must be notified prior to each sampling effort.
6. An annual activity/collection report associated with this permit must be submitted to ODFW by 31 December, 2002. This report should be sent to fish.research@state.or.us. Renewal of this permit is subject to receipt by ODFW of the annual activity/collection report either prior to or in conjunction with the renewal application.
7. No protected species may be taken unless specifically listed below and any other necessary federal authorizations have been granted. See ODFW Sport Fishing Regulations for listing of species, or contact ODFW directly.
8. All numbers of fish authorized in this permit are annual totals.

Appendix A: Permits obtained from Oregon Department of Fish and Wildlife and National Marine Fisheries Service regarding sampling of fish in FOCL (cont.)

9. Persons named above as "Collectors" must sign their own copy of the permit and carry the signed copy while engaged in the activities authorized in this permit.
10. Persons not named above may assist in collecting only while accompanied by project leaders(s) or authorized collector(s) listed above.
11. Additional conditions and authorization:

a) **May capture, examine and release (take) up to a total of 40 hatchery origin juvenile coho salmon, 20 naturally produced (non-adipose finclipped) juvenile coho salmon, 20 hatchery origin juvenile Chinook salmon, 20 naturally produced (non-adipose finclipped) juvenile Chinook salmon and unlimited numbers of other species. After examination, all fish should be immediately released, unharmed, at the capture site.**

b) **Fish may be taken by backpack electrofishing, seining or minnow trap. Electrofishing protocols should follow the guidelines established by the National Marine Fisheries Service (NMFS) in June 2000. Minnow traps must be checked at least once every 24 hours.**

c) **Activities must be coordinated with local ODFW Fish Biologist, Joe Sheahan, *prior to any sampling*.**

d) **If listed coho salmon are encountered they should be released immediately if they were captured. No further sampling should take place at, or downstream of, that survey site,**

e) **Indirect mortality may not exceed 5% of the total take for any species at any site. In the event that mortality for any species exceeds this rate, the permittee should contact Susanna Allen (503/872 5252 x5421), ODFW prior to any further activity.**

f) **This permit only grants authority to conduct this activity under state law. Obtaining appropriate federal clearance under the Endangered Species Act is the permittee's responsibility. If a condition on this permit conflicts with a condition on the federal permit or authorization, then the permittee must comply with the more restrictive condition. Unless otherwise stated in this permit, all authorized take is only for the species, purposes and by the protocols described in the permit application.**

ISSUED BY: Robert M. Hooton DATE: **01/29/02**

Robert M. Hooton
Conservation Biology Program Manager

Distribution: Joe Sheahan

Appendix A: Permits obtained from Oregon Department of Fish and Wildlife and National Marine Fisheries Service regarding sampling of fish in FOCL (cont.)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
525 NE Oregon Street
Portland, Oregon 97232-2737

Sam Brenkman
National Park Service
600 East Park Ave
Port Angeles, Washington 98362

February 11, 2002

Dear Mr. Brenkman:
The Protected Resources Division (PRD) of the National Marine Fisheries Service (NMFS) received notification of your on line applications for coverage under the Endangered Species Act 4(d) Scientific Research limit on January 29, 2002. Your application, OR2002-134, has been reviewed by Oregon Department of Fish and Wildlife's (ODFW) Endangered Species Act Coordinator and NMFS and found to be complete. I understand this is a new project.

Your application states that the purpose of OR2002-134 is to determine presence or non-detection of fish species that inhabit streams in Fort Clatsop National Memorial. The goal of the project is to develop a species list and determine general distributions of fish that occur in selected small streams. Your applications will be considered as part of a complete research package to be submitted by ODFW. I believe you have applied for coverage under the 4(d) Research limit in good faith. Unfortunately, PRD is unable to process ODFW's package–including your request–due to the short time lines associated with the late deployment of the on line application web site and the large number of other research applications received.

In the meantime, we are working through the processes associated with reviewing research under the 4(d) Scientific Research limit for 2002 and expect to complete our analyses shortly. While I cannot authorize you to conduct your research during the processing period, I can describe my confidence that your research will eventually be authorized and my belief that any take related to your research would benefit the listed species.

I apologize for the delay and ask for your continued patience as we develop ways to expedite the process used to apply for, assess, and authorize fisheries research activities under the 4(d) Research limit. If you have any additional questions, please call Leslie Schaeffer at 503-230-5433. Thank you for your cooperation in this matter.

Sincerely,

Garth Griffin
Chief, Protected Species Branch
Protected Resources Division

cc Susanna Allen – ODFW

Appendix B1. Digital photograph of cutthroat trout (162 mm) captured by electrofishing in Alder Creek on February 6, 2002

Appendix B2. Digital photograph of juvenile coho salmon captured by electrofishing in Alder Creek on February 6, 2002

Appendix B3. Digital photograph of cope's giant salamander captured by electrofishing in Alder Creek on February 6, 2002

Appendix B4. Digital photograph of chum salmon fry, sculpin, and threepine stickleback collected in seine near mouth of Alder Creek on February 6, 2002

Appendix C: Original data from electrofishing surveys conducted in Alder Creek.

Olympic National Park Electrofishing Survey Form

River/Creek Name:_____ Alder Creek **Date: 2___/6___/02___**

Time of Survey: Begin: 0845 End: 1430

Purpose of Survey:_Fish presence vs. non-detection

Observer/s & Agency: ___ S. Brenkman, N. Eid, P. Kennedy, S. Stonum, and Lynne Johnson (NPS)

Flow: LOW

Shocker Setting and Voltage Range: I 5: 300 V Electrofishing Pass 1 of 1

Time Counter Begin: NA Time Counter End: NA Water Temperature (°C) 8.2 at time reach one

Conductivity: 110-250 uS/cm (mouth to upper creek)

FISH COUNTS AND MEASUREMENTS

Fish Spp.	Total Length (mm)	Comments	Fish Spp.	Total Length (mm)	Comments
COXX	68	Voucher FOCL-02-FV-5			**Rkm 0.0 to 0.45.**
COXX	58				
COXX	34				
GAAC	20-64	192 fish; Vouchers FOCL-02-FV-2 and 3			
FUDI	79	Voucher FOCL-02-FV-4			Banded killifish (Fundulus diaphanus)
FUDI	68				
FUDI	32				
COXX	79				**Rkm 0.45 to 0.85**
COXX	52				
COXX	85	Voucher FOCL-02-FV-1			
COXX	35				
ONKI	93				
ONKI	NA				
ONKI	100				
ONKI	98				
ONCL	162				
DICO	78 & 113 TL	2 salamanders			
DICO	110 & 146 TL	2 salamanders			**Rkm 0.85 to 1.00**

DATA SUMMARY FOR SURVEY:

Fish Spp.	*Mean Length (TL) (mm)*	*Length Range TL (mm)*	*Total # of Each Species*
COXX	59	34-85	7
GAAC	NA	20-64	192
FUDI	60	32-79	3
ONKI	97	93-100	4
ONCL	162	162	1

Appendix D: Original data from electrofishing surveys conducted in Hansen Creek.

Olympic National Park Electrofishing Survey Form

Page __1_ of __1_

River/Creek Name:_____ Hansen Creek **Date: 2___/6&7___/02___**

Time of Survey: Begin: 1540 End: 1700 on 2/6/02 and 0845 to 0930 on 2/7/02

Purpose of Survey:_Fish presence vs. non-detection

Observer/s & Agency: ___ S. Brenkman, N. Eid, P. Kennedy, S. Stonum, and L. Johnson (NPS)

Flow: LOW

Shocker Setting and Voltage Range: I 5: 300-400 V Electrofishing Pass 1 of 1

Time Counter Begin: NA Time Counter End: NA Water Temperature (°C) 8.4 at time reach one

Conductivity: 56 uS/cm (mouth to upper creek)

FISH COUNTS AND MEASUREMENTS

Fish Spp.	Total Length (mm)	Comments	Fish Spp.	Total Length (mm)	Comments
COXX	70				Rkm 1.93 to 2.25
ONKI	110				
COAS	42	Voucher FOCL-02-FV-6			
COXX	NA	4 sculpins			
ONKI	123				
LAXX	130				
COXX	NA	4 sculpins			
HYRE	NA				
COXX		1 sculpin			
COXX		2 sculpins			
COXX		2 sculpins			
COXX		3 sculpins			
COXX		2 sculpins			
LAXX	NA				
COXX	NA				
COXX		2 sculpins			
COXX	101				
COXX		5 fish			
COXX	51				Rkm 2.25 to 2.90
COXX	NA				
COXX	75				
COXX	65				
COXX	53				
COXX	90				
COXX	56				
COXX	80				

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
U.S. Department of the Interior

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